# CALIFORNIA FARM BUREAU FEDERATION

NATURAL RESOURCES AND ENVIRONMENTAL DIVISION

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May 20, 2008

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*(Via US Mail & Email, with enclosure)*

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*(Via US Mail & Email, with enclosure)*

***Re: Bay-Delta Conservation Plan – Conveyance Workgroup***
***California Farm Bureau Federation Technical Submission***

Dear Jerry and Ann:

At the staff level, the California Farm Bureau Federation has put together an informal "white paper" that contains a suite of physical and operational measures that may address potential adverse water quality impacts of a dual or isolated conveyance system in and around the Delta. Some of the measures are familiar and, in some cases, extensively studied options, whereas others, including certain water exchange options, are relatively new, at least from a Delta conveyance and water quality standpoint. We believe that these ideas are worthy of analysis as the BDCP goes forward, since a dual conveyance system is under consideration.

The "white paper" is enclosed. It does not represent any formal statement of Farm Bureau policy, and it does not imply advocacy of either a conveyance system or individual mitigation measures that may be associated with it. Rather, it is a technical submission at the workgroup level that represents avenues for further discussion and analysis, as the Farm Bureau seeks to join in a positive solution for the Delta that includes measures to protect in-Delta water quality and the historical agricultural production of the region.

We would be greatly interested in any feedback the workgroup has on this paper, through technical consultants or otherwise.

Very truly yours,

**Christian C. Scheuring**
Managing Counsel

JEF\mmm
Encl.

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# SUGGESTED DIRECTION FOR AN ANALYTIC EFFORT THAT MAY ACHIEVE BDCP WATER SUPPLY AND ECOSYSTEM OBJECTIVES WHILE APPROPRIATELY ANTICIPATING AND ADDRESSING ADVERSE WATER QUALITY IMPACTS OF DUAL OR ISOLATED CONVEYANCE

*REVISED*

SUBMISSION BY NGO CALIFORNIA FARM BUREAU FEDERATION FOR TIMELY DISCUSSION AND CONSIDERATION IN THE BDCP PROCESS

**MAY 29, 2008**

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**PROBLEM STATEMENT**:

Directly or indirectly, Delta salinity is a problem that affects the whole of the State of California. It is and will remain a problem for Delta agriculture, and for urban and agricultural South-of-Delta contractors of the CVP and SWP, as well as ecosystems associated with or connected to the Delta. Some of obvious causes of this problem include saltwater intrusion from the San Francisco Bay and Pacific Ocean, tidal mixing and trapping, marine sediment formations on the west side of the San Joaquin Valley, inadequate drainage and disposal of discharge from the San Joaquin Valley, insufficient dilution and insufficient flows in the San Joaquin River, elevated salt loads in runoff to the San Joaquin River, upstream and in-Delta diversions, and exports from the South Delta by the SWP and CVP.

Elevated salinity in the Delta affects water levels for Delta diversions and impairs water quality for irrigation in the South, West and Central Delta. Elevated salinity in the South Delta is a problem for urban areas that draw on the Delta as a source of drinking water (as a source of bromides and, thus, of carcinogenic disinfection byproducts, as well as costly blending and treatment processes). Excessive salinity in imported water adversely affects drinking water quality for urban water purveyors within the State Water Project, whereas the impact of Delta salinity on the Contra Costa Water District and City of Antioch, with their intakes in the West Delta is critical. Elevated salinity is a problem for agriculture in the San Joaquin Valley, Tulare Basin, and other areas of the State where salt loads in exported water concentrate in soils and groundwater, threatening crop yields, water supplies, and long-term agricultural productivity. Finally, saltwater intrusion and high salinity can signal a lack of necessary inflow for fish, which can in turn increase contaminant loads, degrade habitat, and contribute to other problems, including low dissolved oxygen and the proliferation of invasive species such as *Corbula amurensis* and *Egeria densa.*

Without corrective measures, as demand for water supply grows and California's climate changes, problems related to saltwater intrusion and insufficient Delta inflow will predictably worsen. A more immediate concern, however, is that construction and

operation of an isolated or dual facility in the Delta, without significant mitigation, will degrade Delta water quality and, thus, greatly impact in-Delta agriculture and in-Delta water supplies for irrigation. If poor water quality makes farming in the Delta uneconomic, there will be fewer income and revenue generating uses and lower levee assessments from reclamation districts and private landowners to maintain Delta levees. Without sufficient investment and upkeep, existing levees will fail increasingly, gradually converting large areas of the Delta to poor-quality open-water habitat, greatly increasing the tidal prism, and further deteriorating water quality for remaining beneficial uses. Poor in-Delta water quality will make any through-Delta component of dual conveyance impractical, particularly during the drier part of the year that coincides with the irrigation season, if not year-round.

It is possible that dual or isolated conveyance could solve some of the water quality and water supply reliability problems of Delta exporters. This, however, assumes existing water rights, area-of-origin protections, endangered species requirements, and protection of existing beneficial uses can be surmounted without significant reductions in exports. Without continued freshwater flows into the Delta, it is not clear that this will be the case.

The BDCP process has hypothesized a number of potential advantages that could accrue from dual or isolated conveyance to fish species and the ecosystem, including substantial avoidance of entrainment risks, fewer constraints on restoration of desirable habitats, and (in theory) greater variability, more natural hydrology and enhanced functioning of the Delta ecosystem as a natural estuarine system. Here again, though, continuing freshwater flows into the Delta are the essential ingredient: Without these, no amount of physical habitat or reduced entrainment can sustain or recover flow-dependent species and processes—and bypassing the Delta by diverting a significant portion of Sacramento River flow around the Delta will quite obviously reduce the ability to provide such flows with existing water supplies, while still protecting prior water rights and existing beneficial uses.

Isolated or dual conveyance, then, without continuing freshwater flows through the Delta, may have adverse impacts on species and, given existing legal and regulatory constraints, may not ultimately achieve intended water supply reliability benefits either. Finally, the most obvious and inevitable casualty of an isolated or dual system without *significant* mitigation would be Delta agriculture—and not only agriculture in the South Delta, but quite probably agriculture in the North, Central, West and East Delta as well.

**SUGGESTED DIRECTION FOR INQUIRY DIRECTED TOWARD A SOLUTION**:

To explore candidly and forthrightly whether it is possible to address serious potential conflicts between conveyance and water supply on one hand and Delta agriculture and the ecosystem on the other, it is necessary to explore, as quickly as possible, the full range of potential methods to provide freshwater flows to the Delta and offset flows that would be lost to a Sacramento River diversion. If feasible means to provide adequate freshwater flows to the Delta in a dual or isolated scenario exist, an optimized suite of available mitigation methods should be made a prominent and deliberate part of BDCP planning.

Simple arithmetic forces a conclusion that mere operational measures and flexing of regulatory standards and rules will be insufficient to resolve the conflict between an isolated facility and in-Delta water quality. In order for such a system to function for the intended purpose and still accommodate other needs and priorities, rapid identification of an optimized package of physical and functional mitigation measures is a critical need that the BDCP and other planning processes must begin to address at once. To help catalyze and orient this exceedingly important evaluation as soon as possible, the remainder of this memo describes a broad menu of potential mitigation tools. An optimized combination of tools from this menu could help greatly to avoid some of the adverse impacts of alternative conveyance, while at the same time meeting critical water supply and species conservation objectives of the State as a whole.

## MENU OF POSSIBLE MITIGATION OPTIONS REQUIRING IMMEDIATE ATTENTION IN THE BDCP AND OTHER PLANNING PROCESSES:

## I. THE DELTA TRIBUTARIES:

### A. DELTA TRIBUTARIES, SEPARATE PROBLEM STATEMENT:

The current water balance of the Delta is conspicuously dominated by the Sacramento River and its tributaries, including the Feather, Yuba and American Rivers. To a large extent, this is a natural consequence of the northern California's much wetter hydrology. Further contributing to this north-south imbalance, however, is the lack of inflow to the Delta from the San Joaquin River itself and from several major eastside tributaries. The Mokelumne and Hetch-Hetchy Aqueducts, for example, in the immediate upstream vicinity of the Delta, remove substantial volumes of water from the Delta watershed. This artificial removal of major tributary flows shifts much of the burden of salinity control and instream flows for fish to the Sacramento River and its tributaries to the north, the New Melones reservoir on the Stanislaus River, and the SWP and CVP export pumps in the South Delta. Linked directly or indirectly to this circumstance, one observes numerous related problems in the South Delta. Thus, (1) salinity at Vernalis and in the South Delta routinely exceeds established standards for irrigation; (2) falling water levels require rock barriers and other extraordinary measures to maintain diversions from Delta channels; (3) low dissolved oxygen in the Stockton Deep Water Ship Channel on the Lower San Joaquin and in South Delta channels impairs conditions for migrating salmon; (4) invasive, sediment-trapping aquatic weeds proliferate along with the non-native predatory fish species that thrive in them; (5) a variety of contaminants including salt, boron, and selenium enter the Delta at elevated concentrations.

An isolated conveyance structure around the Delta would significantly worsen existing water quality problems in the South Delta and adjacent areas of the Delta by shifting Delta hydrodynamics from a Sacramento River-dominated, perennial freshwater water system to a more saline and tidally influenced environment, characterized by reduced circulation and lower inflow overall, and proportionately greater poor-quality San Joaquin River inflow in particular. Without deliberate and robust mitigation, salinity and other water quality of problems of the South and West Delta will be replicated and extended northward from the

South Delta and inland from the Bay. Thus, lands currently devoted to higher value crops in the Central and South Delta would see dramatic declines in productivity, significantly increased leaching requirements, and fallowing or conversion to lower value, salinity tolerant crops such as those grown currently in the Western Delta or other uses. In addition to the adverse effects on Delta agriculture, degraded water quality, higher contaminant loads, and reduced outflow would adversely affect other beneficial uses, fish species, and ecological processes.

## B. DELTA TRIBUTARIES, POSSIBLE SOLUTIONS:

As detailed above, there are numerous potentially deleterious consequences of an isolated facility without tributary flows and without mitigation. This dire portrait, however, presupposes that a future isolated facility would be operated exclusively or preferentially to any remaining through-Delta method of conveyance. In contrast, it is possible that an isolated facility operated non-preferentially, or an isolated facility sized and designed to facilitate permanent water exchange arrangements on one or more of the Delta's eastside tributaries, could help to reduce some adverse impacts of such conveyance, while simultaneously contributing to the conservation of covered species and reduced regulatory restrictions on exports. A less constrained future conveyance system, therefore, could potentially facilitate and enable opportunities for water exchange arrangements that would not otherwise be possible. Furthermore, benefits associated with such water exchange arrangements, in terms of unmet needs or current vulnerabilities of key partners, could serve to make such exchanges mutually advantageous and more attractive.

## C. DELTA TRIBUTARIES, POTENTIAL WATER EXCHANGE OPTIONS:

### 1. POTENTIAL MOKELUMNE AQUEDUCT EXCHANGE WITH THE EAST BAY MUNICIPAL UTILITY DISTRICT:

Potential Mokelumne Aqueduct Exchange with the East Bay Municipal Utility District: In recent years, the East Bay Municipal Utility District (EBMUD) exported an average of 245,000 acre-feet annually via the Mokelumne Aqueduct to the San Francisco Bay Area,[1] and EBMUD holds water rights of up to 364,000 acre-feet annually from the Mokelumne, subject to streamflow and the water supply needs of senior water rights holders.[2] EBMUD's current supply from the Mokelumne River and growth within its service area make it vulnerable in times of drought.[3] In dry years and in the future, EBMUD's water supplies are also vulnerable to senior and area-of-origin water rights in the Mokelumne

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[1] See California Water Plan Update 2005, Volume 3, Chapter 7, at 7-8.

[2] See California Water Plan Update, Bulletin 160-93, "San Francisco Bay Region" summary, http://rubicon.water.ca.gov/v2/SFR.html#urbanuse.

[3] For detailed information regarding the EBMUD's existing facilities, various possibilities related to integrated regional planning and planning water supply improvements, see EBMUD's Urban Water Management Plan 2005 (http://www.ebmud.com/water_&_environment/water_supply/urban_water_management_plan/default.htm)and October 2006 Public Draft Mokelumne / Amador / Calaveras Integrated Water Management Plan (http://www.ebmud.com/water_&_environment/water_supply/IRWMP_MAC/default.htm).

River watershed. Future growth, both within EBMUD's service area and in the Mokelumne River watershed, will place further strains on EBMUD's existing water supplies. Potential reduced reliability from declining snowpack and early runoff forecast possible additional vulnerabilities related to EBMUD imported Mokelumne River supplies. Other perennial concerns of EBMUD include (1) the Mokelumne River's extremely variable hydrology, (2) periodic service interruptions related to excessive turbidity, (3) the prospect of severe rationing during multi-year droughts such as the historic 1977-78 and 1987-1991 droughts, (4) obligations to downstream users and to meet instream flow requirements, (5) seismic and flood vulnerabilities in the Delta and throughout the Bay Area, and (6) limited opportunities to participate in interregional water transfers or conjunctive use possibilities North or South of the Delta.

More reliable Sacramento River water from an isolated facility could provide an incentive for EBMUD to forego diversions from the Mokelumne River under certain conditions as a way of partially addressing water quality impacts in the Delta and, at the same time, improving conditions for fish.

Camanche and Pardee, with capacities of 417,000 acre-feet and 198,000 acre-feet, respectively,[4] and both controlled and operated by EBMUD, could provide flexibility in regulation and timing of releases to the Delta. Significant restoration of tributary flows in the Mokelumne River could in turn greatly lessen the adverse impact of these facilities on historic fisheries below these dams. A proposed intertie between EBMUD's Mokelumne Aqueduct and the SFPUC's Hetch-Hetchy (the SFPUC-Hayward-EMBUD Intertie) could facilitate transfers among these Bay Area water purveyors or from outside the region.[5] SFPUC's Hetch-Hetchy system includes an existing Milpitas Intertie and two South Bay Aqueduct interties.[6] Similarly, a proposed connection between EBMUD's Mokelumne Aqueduct and Freeport Regional Water Project and Contra Costa Water District's Los Vaqueros Reservoir would further enhance the potential for regional water exchanges.[7]

In a future scenario involving dual or isolated conveyance through the Delta, Zone 7, State Water Project and Central Valley Project contractors would benefit from a dual or isolated conveyance facility. Future interties between Delta-Mendota Canal and California Aqueduct, EBMUD's Mokelumne Aqueduct and/or SFPUC's Hetch-Hetchy Aqueduct would, in effect, connect the Bay Area to water markets North and South of the Delta. This could in turn favor water exchanges that would increase the reliability of Bay Area supplies, while reducing reliance on imported supplies from the Mokelumne and Tuolumne Rivers.

Such water exchange arrangements among Bay Area agencies and with areas North and South of the Delta could help to mitigate adverse water quality impacts from isolated or dual conveyance by replacing a portion of the Central and South Delta's lost inflow from

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[4] See California Water Plan Update 2005, Volume 4 at 4-647, 4-649.
[5] See EBMUD's 2005 UWMP, *supra*, at 2-5, 2-9.
[6] See SFPUC 2005 Urban Water Management Plan at 28 (http://sfwater.org/mto_main.cfm/MC_ID/13/MSC_ID/165/MTO_ID/286).
[7] See EBMUD 2005 UWMP at 2-5, 2-11.

the Sacramento River. Supplemental Mokelumne River flows could be particularly important in dry years, when water quality conditions in the Central and South Delta would be most impacted. Furthermore, increased Mokelumne River flows could help to mask potential false cuing effects from possible increased Sacramento River flows from DCC reoperation, a Through-Delta Facility, or a Middle River conveyance corridor.

## 2. POTENTIAL HETCH-HETCHY AQUEDUCT EXCHANGE WITH THE CITY OF SAN FRANCISCO:

Hetch-Hetchy Aqueduct Exchange with the City of San Francisco: In recent years, the San Francisco Public Utilities Commission (SFPUC) diverted an average of 267,000 acre-feet a year from the Tuolumne River via the Hetch-Hetchy Aqueduct.[8] From SFPUC's Hetch-Hetchy / O'Shaughnessy Reservoir (360,000 acre-feet),[9] en route to the City of San Francisco and environs, the Hetch-Hetchy Aqueduct passes under New Don Pedro Reservoir (operated and controlled by Turlock Irrigation District and Modest Irrigation District, with a total capacity of 2,030,000 acre-feet).[10] Of this 2 million acre-feet of total storage capacity, SFPUC has rights to store between 570,000 and 740,000 a year for use at times when senior rights on the Tuolumne allow export of this water. Below New Don Pedro, on the Valley Floor, the SFPUC's aqueduct passes under both the federally controlled Delta-Mendota Canal (DMC) and state-controlled California Aqueduct. With some modifications to existing infrastructure, SFPUC's storage at Hetch-Hetchy, Cherry Lake, Lake Lloyd, and its "water account" in New Don Pedro reservoir could be used to both regulate releases into the Tuolumne River and maintain carryover supplies year to year. As noted above, new interties between the SFPUC's Hetch-Hetchy reservoir, the DMC, and the California Aqueduct could be used in combination with planned and existing interconnections to CCWD, the Santa Clara Valley Water District (SCVWD), Zone 7, EBMUD, and others to facilitate mutually beneficial exchanges of exported Sacramento River water, in lieu of water currently diverted by the SFPUC from the Tuolumne River. Storage in existing or potential future Bay Area reservoirs, including a possible Los Vaqueros Expansion, would supplement SFPUC's storage in the upper watershed.

In the case of the Tuolumne River and SFPUC's Hetch-Hetchy Aqueduct, as with the Mokelumne River and EBMUD's Mokelumne Aqueduct, foregone tributary water would remain in the river, augmenting freshwater flows to the South and Central Delta. Such an arrangement could potentially reduce the current burden on the CVP's facilities at New Melones to meet South Delta agricultural standards. In addition, such an option could provide a functional equivalent of recirculation from the DMC, while avoiding potential

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[8] See California Water Plan Update 2005, Volume 3, Chapter 7 at 7-8.

[9] See California Water Plan Update 2005, Volume 4 at 4-649. For a detailed information concerning SFPUC's existing facilities and current water planning activities see also the SFPUC's "2005 Urban Water Management Plan for the City and County of San Francisco (http://sfwater.org/mto_main.cfm/MC_ID/13/MSC_ID/165/MTO_ID/286) and June 2007 Draft Program Environmental Impacts Report for SFPUC's Water System Improvement Program (http://www.sfgov.org/site/planning_index.asp?id=80530).

[10] See id. at 4-646.

fish cuing problems associated with the latter.[11] In combination with potential restored flows from Friant in the Upper Reaches of the San Joaquin River, supplemental Tuolumne River flows could help restore salmon and other anadromous fish in the San Joaquin River and its tributaries. Lastly, of relevance to South Delta agriculture, particularly in dry years and late summer, these restored tributary flows could help to correct the historic problem of insufficient tributary flows to the Delta that an isolated or dual conveyance facility would significantly worsen.

### 3. SAN JOAQUIN AND SACRAMENTO COUNTY WATER USERS ON THE MOKELUMNE, CALAVERAS, AND STANISLAUS, LOWER SAN JOAQUIN RIVERS:

#### a) SAN JOAQUIN COUNTY AND SOUTH DELTA INSTREAM FLOW AUGMENTATION THROUGH SMALL-SCALE WATER TRANSFERS, CONJUNCTIVE MANAGEMENT OR SUBSTITUTE WATER SUPPLY:

San Joaquin County and South Delta Instream Flow Augmentation: Local water agencies in San Joaquin County that rely currently upon variable surface water supplies and limited local groundwater might have an interest in contracting for firm, relatively high quality deliveries from an isolated facility, in lieu of water such districts might otherwise divert from the Mokelumne, Calaveras, Stanislaus, and Lower San Joaquin Rivers. While this concept would require much additional reconnaissance in terms of its actual feasibility, potential beneficiaries on the Lower Mokelumne include Woodbridge ID, Woodbridge WUCD, Lockeford CSD, North San Joaquin WCD, and the City of Lodi. Similarly, potential participants on the Calaveras River and Lower San Joaquin include Stockton East Water District, the City of Stockton, the County of San Joaquin, the California Water Service Company, the Cities of Lathrop and Manteca, and the Central San Joaquin Water Conservation District. Lastly, in the Delta itself, it may be possible to directly improve flows and future water quality in the South and Central Delta by directly delivering substitute or supplemental water from an isolated facility to agricultural users on the Lower San Joaquin.

#### b) SOUTHEASTERN SACRAMENTO COUNTY & FOLSOM-SOUTH CANAL:

Southeastern Sacramento County and Folsom-South Canal: The unfinished Folsom South Canal runs 27 miles, north-to-south, from Lake Natoma and Nimbus Dam to the Sacramento Municipal Utility District's (SMUD's) defunct Rancho Seco Nuclear Power Plant on the Consumnes River.[12] Originally, the Canal was to continue an additional 42-miles south.[13] Because the CVP's Auburn-Folsom South Unit was never completed, however, historically expected water supplies from Auburn Dam and the American River

[11] See Section II.A.3 below.
[12] See USBR Mid-Pacific Region Office description of planned CVP Auburn-Folsom South Unit project (http://www.usbr.gov/dataweb/html/auburn.html).
[13] Ibid.

have never materialized for a number of agricultural and municipal water users in Sacramento and San Joaquin Counties that depend, as a result, on limited local surface and groundwater supplies.

As part of its Freeport Regional Water Plan project, EBMUD is currently constructing a pipeline from the end of the existing Canal, south to EBMUD's Mokelumne Aqueduct.[14] Under a negotiated agreement with the Sacramento County Water Agency (SCWA), EBMUD plans to divert up to 110 thousand acre feet from the Sacramento River in "dry" years only, via the existing section of Folsom South Canal, and by pipeline from the end of the existing FSC to the Mokelumne Aqueduct near Camanche Reservoir.[15] SCWA will utilize the FRWP, in all water year types, to divert up to 95 thousand acre feet from Sacramento River for service to Rancho Cordova and to the rapidly urbanizing Elk Grove, Laguna, Vineyards areas, south and east of Sacramento and north of the Consumnes River.[16] In addition, as a settlement of previous claims against the EBMUD, EBMUD will utilize unused capacity in its Folsom South Connection to wheel a small amount of CCWD's total CVP contract entitlement for storage at Los Vaqueros.[17]

South of SCWA's Zone 40, the Galt Irrigation District, Clay Water District, and Omochumne-Hartnell Water-District (on the Consumnes River above Cosumnes Preserve and South and East of Elk Grove) lie along the southern-most alignment of the existing Folsom South Canal, but rely primarily or entirely on local groundwater, local streams, and the Consumnes and Mokelumne Rivers, as opposed to surface water deliveries from Folsom-South Canal. On-going groundwater recharge, conjunctive management, and stream restoration efforts by these still largely agricultural districts, SCWA , The Nature Conservancy, and others[18] could be expanded with potential deliveries of purchased surface water supplies from Folsom Lake, including water supplies no longer required by SMUD for use at Rancho Seco or possible entitlements associated with historic water rights applications related to Auburn Dam. Direct deliveries from Folsom South Canal could (1) reduce pressure on local groundwater supplies, (2) improve flood control for the City of Sacramento, (3) support the local agricultural economy by increasing local water supply reliability, (4) increase instream flows for fish and wildlife and floodplain restoration purposes, and (5) potentially increase freshwater flows in the North and Central Delta.

Other water exchange possibilities in this area include the use of unassigned wet and normal year capacity in EBMUD's FRWP Folsom South Canal Connection facilities to

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[14] For a detailed description of this project see EBMUD's 2005 UWMP, *supra*, at 2-13 and 2-14.
[15] See Freeport Regional Water Project description at http://www.freeportproject.org/nodes/project/index.php; July 2003 FRWP Draft EIR/EIS (http://www.freeportproject.org/nodes/project/draft_eir_eis_v1.php). Note "dry" years, for purposes of the FRWP settlement, are defined as rationing years in which EBMUD's base supply fall below 500,000 acre-feet.
[16] Ibid.
[17] See EBMUD 2005 UWMP at 2-11.
[18] For information, see website of the South Sacarmento Agricultural Water Authority (http://sscawa.org/sscawa/projects.cfm). Regarding the related Central and South Sacramento County Regional Water Partnership, see EBMUD UWMP 2005 at -2-21 and 2-22.

carry out conjunctive use projects in Central and South Sacramento County and North Eastern San Joaquin County. Similarly, while such projects would need to be sensitive to concerns relating to local groundwater, large-scale storage and conveyance capabilities in EBMUD's Mokelumne Aqueduct and at Pardee and Comanche Reservoir could combine with local needs in historically declining groundwater basins to favor additional conjunctive use and groundwater banking arrangements and, potentially, return tributary flows to the Delta. [19]

## II. OTHER POTENTIAL PHYSICAL MEASURES TO MAINTAIN ACCEPTABLE WATER QUALITY IN THE DELTA:

### A. WATER ROUTING OPTIONS TO COUNTERACT SALINITY INTRUSION, STAGNATION, AND WATER QUALITY DEGRADATION IN THE CENTRAL AND SOUTH DELTA:

#### 1. THROUGH-DELTA FACILITY:

Through-Delta Facility: One or more screened diversions in the vicinity of the CVP's existing Delta-Cross Channel gates and/or Georgiana Slough could work in tandem with dual conveyance, providing freshwater flows from the Sacramento River into the interior Delta. From there, water would flow toward the export pumps, primarily, via the South Fork Mokelumne River and Middle River. Diversions through such a screened facility to meet water quality standards and improve flow and habitat conditions could occur year-round, without the current constraints on gate operations related to the outmigration of juvenile salmon in the Sacramento River.[20]

A screened through-Delta facility is a component of at least one concept for a through-Delta conveyance that could help to conserve species by achieving greater isolation of water conveyance from key fish migration corridors.[21] In addition, such a facility could work well in support of a dual conveyance alternative that maintains in-Delta water quality, while at the same time achieving water supply reliability elsewhere in the state. For example, with adequate dredging of relevant conveyance channels, increased flexibility from a screened Sacramento River diversion could be used to alter the timing and volume of exports in dry versus normal and wet years.

Investigation of a through-Delta facility was one of the through-Delta measures outlined in the CALFED ROD and EIR/EIS and to have been studied and potentially implemented in

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[19] See, e.g., information regarding efforts of the existing Northeastern San Joaquin Groundwater Banking Authority (http://www.gbawater.org/).

[20] One option in particular, designated "TDF Alignment 5" in DWR's December 7, 2007 "Delta Conveyance Improvement Studies Summary Report," would increase capacity of the existing DCC by 50%, while avoiding extensive dredging associated with other potential alignments. This option would necessitate significant levee improvements along a South Mokelumne-Middle River conveyance corridor—but so too would virtually any other option that seeks, meaningfully, to mitigate the substantial adverse water quality impacts of a dual or isolated conveyance alternative.

[21] See Russ Brown, "Delta Corridors" submission to Delta Vision Blue Ribbon Task Force, dated July 26, 2007 (http://www.deltavision.ca.gov/DeltaVisionVisions.shtml)..

support of the CALFED ROD's preferred alternative, involving continued through-Delta conveyance, with a potential decision point on conveyance after year 7 of the CALFED program.[22] Unfortunately, as summarized in a recent status report,[23] while DWR and others have done numerous technical studies on such a facility, these studies have not produced any result, in terms of a well-developed, potentially implementable concept.

Given the significant water quality implications of the dual and isolated conveyance options currently being considered, study of a potential through-Delta facility merits much more rigorous and systematic study. Continued study of a through-Delta facility should occur on an expedited and greatly intensified basis, as a deliberate and integrated part of any studies of dual or isolated conveyance.

## 2. MODIFIED DCC OPERATIONS:

Modified DCC Operations: Modified operations of the Delta Cross Channel gates were conceived in the CALFED ROD as a less robust means to achieve some of the water quality, improved conveyance, and water supply reliability objectives of a through-Delta facility. Studies of potential modified DCC operations were to be completed well within the first seven years of the CALFED program before any decision on a potential through-Delta facility.[24] To date, such studies have yet to produce any definitive result[25]—and remain, it seems, a barrier to serious study of a more robust alternative involving a through-Delta facility. In addition to studies of a through-Delta facility, which should proceed immediately and without delay, modified DCC operations should remain as part of the range of potential mitigation alternatives warranting deliberate and focused consideration by the BDCP at this time.

## 3. RECIRCULATION:

Recirculation: Studies and potential implementation of possible "recirculation" of exported Sacramento River water from the Delta-Mendota Canal to the San Joaquin River are required as conditions of the State Water Quality Control Board's 1995 Water Quality Control Plan for the Sacramento-San Joaquin Bay-Delta, Water Rights Decision 1641, Public Law 108-361 (the "CALFED Bay-Delta Reauthorization Act"),[26] and the CALFED Record of Decision. Recirculation would serve to provide alternative means of meeting flow and salinity requirements at Vernalis and protecting downstream beneficial uses, while reducing current reliance on upstream releases from New Melones and pumping restrictions on the CVP and SWP facilities. The Bureau of Reclamation and the Department of Water Resources have completed various small-scale pilot studies, as well

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[22] For a comprehensive list of unrealized water quality and conveyance commitments from the CALFED program, see the August 28, 2000 CALFED ROD at 23-29, 48-52, 65-69.
[23] See Delta Conveyance Improvement Studies Summary Report, dated December 7, 2007.
[24] See CALFED ROD at 23-24, 50-51.
[25] See ibid.
[26] Public Law 108-361, Water Supply, Reliability, and Environmental Improvement Act [October 25, 2004; 118 Stat. 1681.

as a Plan of Study and, under the current schedule, a Draft EIS/EIR and Final Feasibility Study are expected out in late summer 2008 and spring of 2009, respectively.[27]

Studies to date suggest recirculation could provide a partial solution to several problems, but have, at the same time, highlighted certain barriers to implementation, as well as some potential adverse effects. Thus, on one hand, recirculation could enable several potential positive outcomes, including (1) reduced reliance on releases from New Melones and, thus, more reliable water supplies for upstream users on the Stanislaus River; (2) reduced reliance on groundwater and, thus, reduced overdraft and salinity intrusion in local groundwater basins resulting from unreliable or insufficient surface water supplies; (3) increased water supply reliability to the CVP and SWP, with a possible less frequent need for pumping curtailments; (4) improved flows and higher DO for migrating salmon; (5) improved flows, lower salinity, and higher water levels for South Delta agriculture; (6) assistance with requirements relating to San Joaquin River TMDLs for dissolved oxygen, salinity, and boron; (7) potential coordination to help meet objectives of the San Joaquin River Restoration settlement (*NRDC v. Rodgers* Friant settlement); (8) improved water quality consistent with objectives of the Regional Water Quality Control Board's Salinity Management Plan, work by the San Joaquin River Water Quality Management Group, and the West Side Region Drainage Plan. In contrast, potential barriers and problems associated with recirculation include (1) the potential for adverse fish imprinting, straying, and entrainment effects associated with higher exports and artificial re-routing of Sacramento River in the Lower San Joaquin; (2) potential interference with deliveries or reduced water supply to CVP and SWP contractors and impacts on San Joaquin River Exchange Contractors or at San Luis Reservoir.

A significant problem with the recirculation scenarios studied to date—and, thus, with any Draft EIS/EIR or Feasibility Study—is that these scenarios look only at existing conveyance. Thus, assumptions regarding entrainment impacts and water deliveries may ignore potential opportunities and the increased flexibility that could come with dual or isolated conveyance. In addition, existing studies have not considered how dual or isolated conveyance could significantly worsen, extend, and compound the existing problems recirculation is intended to address. While dual or isolated conveyance might help ensure more reliable exports, it could simultaneously ensure the need for higher upstream releases from storage—thus, not only increasing the burden on New Melones, but also extending this burden to other reservoirs, including Oroville, Shasta, Folsom and others.

While dual or isolated conveyance would likely worsen, compound, and extend existing water quality problems in the South Delta, however, it is at the same time pertinent to note that such conveyance could potentially remove some barriers to implementation of recirculation. Thus, specifically, by removing some of the current constraints on exports,

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[27] For detailed background on "DMC Recirculation Project," see Initial Alternatives Information Report (IAIR), dated March 2008 (http://www.usbr.gov/mp/dmcrecirc/docs/dmc_recirc_iair_03-2008.pdf) and/or "Plan of Study," dated May 2006 (http://www.usbr.gov/mp/dmcrecirc/docs/dmc_pos_fnl_05-26-06.pdf). See also, generally, Bureau of Reclamation and Department of Water Resources websites http://www.usbr.gov/mp/dmcrecirc/index.html and http://baydeltaoffice.water.ca.gov/sdb/recirc/index_recirc.cfm#Background.

dual or isolated conveyance could make it possible to export and recirculate additional Sacramento River water, without impacting deliveries to export contractors of the CVP and SWP, or competing with other priorities, such as water transfers and the EWA, or the wheeling of refuge water.

As for the problem of potential adverse impacts on fish from false imprinting, straying, or entrainment, it would be necessary to evaluate whether such potential, adverse impacts truly outweigh the potential benefits of increased instream flows, dilution, and higher dissolved oxygen. If such an evaluation clearly shows the impacts on fish to outweigh the benefits, it would still be necessary to weigh any potential adverse effects on fish against the corresponding benefits to water quality and water supply reliability. Lastly, if concerns relating to imprinting and straying prove overwhelming adverse it may be possible to achieve a functional equivalent of recirculation, as discussed above, through potential water exchanges to restore tributary flows on the Mokelumne and Tuolumne Rivers.[28] These uncertainties aside, there can be no doubt that recirculation is an important tool in the toolbox of actions to mitigate the potential adverse impacts of dual or isolated conveyance on flows and water quality.

## B. MIDDLE & OLD RIVER CORRIDORS, SOUTH & WEST DELTA BARRIERS:

### 1. FRANKS TRACT PROJECT AND/OR POTENTIAL NEAR-TERM BARRIERS:

Franks Tract Project and/or Potential Near-term Barriers: Relatively simple improvements at Franks Tract in the western Delta have potential to significantly reduce salinity in the Central and South Delta and, also, provide benefits to fisheries by reducing entrainment risks at the State and Federal pumps. In particular, current analyses suggest an operable gate on Three-Mile Slough could yield significant benefits for both fisheries and water quality. Still more recent analyses for the BDCP show that a pair of operable barriers just east of Franks Tract, in Connection Slough and Old River at the upper northwest corner of Bacon Island, or on either side of Quimby Island, could allow CVP and SWP through-Delta operations to continue, while very significantly reducing entrainment risks at the state and federal facilities. Initial modeling suggests that use of these barriers in combination with an operable gate on Three-Mile Slough and potential modified operations of the Delta Cross Channel could increase the effectiveness of these barriers still further.

In relative terms, options involving in-Delta barriers, and particularly movable barriers, would be inexpensive, easily reversible, and conducive to adaptive management. Such infrastructure would have utility, both near-term and as a potential component of some longer term solution. Like the South Delta Improvements Project barriers,[29] Franks Tract Project and other feasible in-Delta barrier options are, essentially, 'no regrets' actions.

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[28] See "DELTA TRIBUTARIES, POTENTIAL WATER EXCHANGE OPTIONS" above.
[29] See further discussion below.

Along with SDIP and a potential Old River Corridor, BDCP studies of dual and isolated conveyance should take a comprehensive look at the use of in-Delta barriers to realize mutually supporting water quality, reliability, and fisheries benefits.

## 2. SOUTH DELTA IMPROVEMENTS PROJECT:

South Delta Improvements Project: The purpose of a series of operable barriers under the proposed South Delta Improvements Project ("SDIP") would be to improve water quality and water levels in the South Delta, while simultaneously benefiting fisheries and increasing operational flexibility and water supply reliability. The project is specifically identified in the CALFED ROD for early implementation as an element of that program's "Conveyance" package of actions.[30] Furthermore, a preliminary assessment of dual conveyance recently completed by DWR's South Delta Regional Office suggests these operable barriers would be fundamentally important to water quality management in the South Delta.[31] Stage I of the SDIP project would provide immediate benefits, in all of the identified areas, independent of a separate, deferred decision regarding any potential raising of current regulatory limits on pumping. At the same time, where biological impacts could be avoided or mitigated, the possibility of higher pumping limits at select times in the future could help to correct the current disconnect between timing of exports and water year type. Like Franks Tract and other potential in-Delta barrier options, SDIP is a "no-regrets" action with few unmitigable adverse impacts on one hand, and substantial water quality, water supply, and fisheries benefits to appease a whole range of varied interests on the other. Unfortunately, despite a completed EIR/EIS, implementation of the SDIP project remains elusive. Along with Middle River Conveyance and a future Franks Tract Project, useful elements of the SDIP project should be expressly incorporated in BDCP planning for alternative conveyance at this time.

## 3. MIDDLE & OLD RIVER CORRIDORS:

Middle & Old River Corridors: In concept, the Middle River Conveyance option resembles the BDCP's Conveyance Option 2. The concept involves use of the South Mokelumne and Middle River as a dedicated conveyance corridor to the South Delta—and "isolation" of Old River as a dedicated fish passage corridor. The concept has been preliminarily studied in various incarnations to date, by the Metropolitan Water District of Southern California (MWDSC) and the Department of Water Resources (DWR), by Jon Burau of the USGS (as the "Eco-crescent" concept) and, in the greatest detail it seems, by the concept's originator, Russ Brown of Jones & Stokes, in a "Delta Corridor" paper, as subsequently refined with funding and conceptual input from the South and Central Delta Water Agency (SDWA and CDWA).[32]

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[30] See CALFED ROD at 48-50.

[31] See DWR's April 2008 "Initial Assessment of Dual Water Conveyance" for the Delta Vision Blue Ribbon Task Force.

[32] See Russ Brown, "Delta Corridors" submission to Delta Vision Blue Ribbon Task Force, dated July 26, 2007 (http://www.deltavision.ca.gov/DeltaVisionVisions.shtml); South Delta Water Agency and Central Delta Water Agency "Comprehensive Water Management Plan" (CWMP), submitted to the Delta Vision Blue Task Force and dated October 15, 2007

Near-term or long-term, either singly or in combination with an isolated facility, a through-Delta conveyance option similar to the "Delta Corridors" concept described by Russ Brown could have various benefits, as follows: (1) By drawing exports from an isolated water supply corridor linked to the Sacramento River, such an option would avoid much of the current tidal mixing and recycling of salts from and to the South Delta via the CVP; (2) By directing the entire flow of the San Joaquin River down Old River, sediment, phytoplankton, productivity, and turbidity that is current lost to stagnant and anoxic conditions in the Stockton Deep Water Ship Channel and exports by the CVP and SWP, would instead reach the Suisun Marsh and the larger estuary below and possibly improve food availability there; (3) Sacramento River water diverted year-round through the DCC and/or Georgiana Slough would protect existing beneficial uses by maintaining the historic "Delta pool," while at the same time leaving the isolated Old River fish passage corridor for possible experimentation with variable salinity, subject to existing water quality standards and the remaining consumptive water needs of diverters in that the portion of the Delta; (4) dredging along the South Forth Mokelumne would serve the dual purpose of increasing channel capacities and could provide a significant volume of dredge material for levee improvements, so as to relieve flood pressures on adjacent leveed farmland; (5) such dredging and flood benefits could support the objectives of proposed flood and habitat improvements on McCormack-Williamson Tract and/or the Lower Consumnes and Mokelumne Rivers;[33] (6) subject to possible relocation of affected diversions to the water supply corridor to the east, dead sloughs produced by barriers on lateral channels, such as Woodward Cut, Railroad Cut, and Connection Slough, could be used in experiments to establish open water pelagic fish habitat and simulated or partially constructed, but self-sustaining "drendritic channels"; (7) in contrast to a dual facility, many relatively simple and inexpensive modifications to the existing through-Delta system could be easily reversed or used for experimental adaptive management; (8) water standards establish for the protection of existing beneficial uses could go largely unchanged; (9) such an alternative could potentially combine with a dual facility, at such time as one were constructed.

The BDCP "Conservation Strategy Options Evaluation Report," dated September 17, 2007, alluded to certain engineering constraints associated with the particular Middle River concept considered in that document. Our understanding, based in part on assertions in the report itself and in part on subsequent clarifications by the BDCP consulting team, is that some or all of these engineering constraints are surmountable. Furthermore, we have reason to believe that the cost-estimates from a "conveyance assessment" recently completed by DWR for the Delta Vision Blue Ribbon Task Force do not include possible less expensive means of constructing and protecting a through-Delta corridor. Ultimately,

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(http://www.deltavision.ca.gov/BlueRibbonTaskForce/Oct2007/Handouts/Item_7_Attachment_2.pdf ); "Tidal Hydraulics Modeling (DSM2) of the Delta Corridors Plan, submitted by South Delta Water Agency to Delta Vision Blue Ribbon Task Force on November 9, 2007 (http://www.deltavision.ca.gov/Correspondence/South_Delta_Water_Agency_with_Delta_Corridors_Plan_Attachment_11-13-07.pdf).

[33] See Draft EIR for the North Delta Flood Control and Ecosystem Restoration Program at http://www.dfm.water.ca.gov/dsmo/northdelta/documents.htm.

whether some variant of Middle River Conveyance functions as part of a potential interim solution or as a long-term option, feasible means of removing engineering obstacles and optimizing performance should be an integral part of the BDCP and other related planning efforts.

### C. LONG-TERM EWA OR SUCCESSOR:

Long-term EWA or Successor: The Environmental Water Program, emerging from the CALFED program, relies on water transfers from willing sellers to establish a kind of "bank account" of dedicated environmental water. To date, the EWA has focused primarily on fish benefits associated with deliberate alterations in the timing of exports. Assets from the Environmental Water Account are expended either to enhance flows for fish or to offset water supplies lost during voluntary curtailments at the pumps.

While it is no doubt true that some incidental environmental and water quality benefits from the EWA have accrued in upstream areas and the Delta, direct augmentation of tributary flows or improvement of water quality have not been a significant focus of the EWA program to date. With the prospect of dual or isolated conveyance in the future, it is possible that instream flow augmentation and water quality mitigation could become express objectives of a future EWA or successor program, along with fisheries protection and direct avoidance of adverse effects from exports.

Similarly, separate "pots" of current and potential future environmental water could be managed in some integrated fashion to achieve multiple objectives, including salinity control in the Delta, as well as fish protection and enhanced in-stream flows. Potential options here include (b)(2) and (b)(3) water under section 3406 of the Central Valley Project Improvement Act (CVPIA), VAMP flows, and potential flows deriving from long-term implementation of the Phase 8 Settlement of the State Water Resources Control Board's Bay-Delta Proceedings on the 1995 Water Quality Control Plan.

## III. OTHER PERTINENT TOOLS FOR COMPREHENSIVE SOLUTIONS THAT AVOID DISPROPRORTIONATE IMPACTS:

### A. NEW SURFACE WATER STORAGE:

New Surface Water Storage: In addition to groundwater banking, conjunctive use, water efficiency, and water recycling, all of which should continue and expand in direct support of any long-term solution for the Bay-Delta, new surface storage will be necessary to prepare for future impacts of climate change and increase flexibility to achieve various environmental objectives. In particular, new South-of-Delta facilities will be needed to optimize future conveyance, improve the timing of water exports, and reduce hydrologic impacts on listed species and the Delta in drier years. Similarly, increased surface water storage capacity in both the Sacramento and San Joaquin River watersheds would enhance the State's ability to achieve multiple objectives, including protection of environment, water supply, and salinity control. Thus, while new surface water storage facilities go significantly beyond the scope of the BDCP, Delta conveyance and the BDCP exist within

a larger statewide context. In recognition of this fact, BDCP strategies should expressly consider potential synergies relating to future investment in new surface water storage.

### B. WATER EFFICIENCY / DEMAND REDUCTION:

Water Efficiency / Demand Reduction: Water efficiency, demand reduction, and "regional self-sufficiency," as it has been called, provide means of indirectly reducing ecological pressures on the Delta over time. Conserved water, beyond the mere movement of existing supplies around the state, is in effect "new water." Within the context of the BDCP, water efficiency in export-dependent areas south of the Delta could be encouraged and incentivized through linkages to the ESA's incidental take provisions. Measurable progress toward meeting economically and technically achievable efficiency goals could be tied to greater flexibility under a future Section 10 permit or set of permits, or for certain covered activities, including Delta exports and water transfers.

### C. URBAN WATER USE EFFICIENCY, RECYCLING, AND DESALINATION:

Urban Water Use Efficiency, Recycling, and Desalination: The California Water Update projects a potential yield from urban water use efficiency of between 1.2 and 3.1 million acre feet by 2030, and up to 1.4 million acre-feet from recycled municipal water.[34] Similarly, in addition to 587,200 acre-feet from desalination plants assumed to be operational by 2030, the Water Plan projects high and low annual yields of between 300,000 and 500,000 acre-feet within the same period.[35] Future urban water use efficiency and recycling and desalination represent large blocks of potential "new water," with few environmental impacts. New water supplies from desalination projects, urban water use efficiency, and water recycling could significantly offset the need for imported supplies from the Sacramento-San Joaquin River Delta well within the 50-year life of the BDCP. Such options should be aggressively pursued, if not as an expressly linked component of the BDCP, then certainly in parallel regional planning efforts to supplement the BDCP itself.

### D. UPSTREAM SALINITY MANAGEMENT / AG DRAINAGE:

Upstream Salinity Management / Ag Drainage: Present and future efforts to address drainage issues and salinity impacts on the west side of the San Joaquin Valley have long-term relevance to the question of in-Delta water quality, particularly under potential future dual or isolated conveyance. Fully isolated or dual conveyance could help, significantly, to reduce the amount of salt currently exported to the San Joaquin Valley. While reducing contaminant loads, however, long-term efforts to reduce the amount of salt, boron, and

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[34] See 2005 California Water Plan Update, Volume 2, Figure 1-1. NOTE: In contrast to the large potential for dramatic gains from urban water efficiency, the range of potential gains from agricultural water efficiency during the same period is just 200,000 to 800,000 acre-feet per year.

[35] Whereas estimates in 2005 Water Plan Update derive from a set of pre-POD and pre-Wagner assumptions, Governor Schwarzenegger's recent call for a 20 percent statewide *per capita* reduction in water use through urban water use efficiency may provide impetus for ever higher gains.

selenium that enters the San Joaquin River and Delta must ensure continued water service and agricultural productivity on the west side. Future conveyance must strike a balance between in-Delta water quality and the quality of exported water. At the same time, workable west-side drainage options could build toward achieving express objectives of the BDCP. Given such interrelationships, in addition to the long-term need for west-side drainage improvements in any case, it seems entirely appropriate to consider potential, future west-side drainage and salinity management actions as possible, long-term conservation or mitigation measures for the 50-year BDCP.

### E. RESERVOIR REOPERATION:

Reservoir Reoperation: In addition to the other options identified above, there may be opportunities to realize multiple benefits for the ecosystem, water supply and water quality through reoperation of upstream reservoirs. Reoperation would modify existing operational rules and priorities, opportunistically, to accomplish a new set of benefits, while still meeting increasing water demands of the State. By releasing more water under certain conditions, it may be possible to reestablish greater functionality and productivity in downstream floodplains, wetlands, and open-water embayments.[36] Reoperation could provide more frequent peak flows, greater stochasticity and variability than exists currently, which could in turn more closely approximate a more natural hydrograph and, thus, favor native, as opposed to non-native organisms. On the supply side, as well, reoperation in combination with aggressive groundwater banking, recharge, conjunctive use, and water transfers could offset associated water supply losses and potentially even increase yield. In particular, with improved conveyance through and across the Delta, large volumes of vacated aquifer space in the San Joaquin Valley could be used to store surplus flows in wet years. Available reservoir space from one year (or from earlier in the same year) would become increased supply at a subsequent time—which is to say, new yield as opposed to water currently lost to flood control with little or no opportunity for recovery. While local and regional groundwater recharge, groundwater banking, and flood bypass solutions would need to overcome significant legal, political, institutional complexities, improved groundwater conditions to the south could ultimately provide a greater margin of local supply with which to weather dry years and prolonged drought periods. Furthermore, smarter, more integrated operation of the state's existing reservoirs,

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[36] For more information relating to potential opportunities related reservoir reoperation, groundwater banking and conjunctive use, and flood management management, as well as some of the challenges, complexities, and trade-offs associated with such concepts, see, Thomas, Fullerton, et al., *Feasibility Study of a Maximal Program of Groundwater Banking*, Natural Heritage Institute, December 1998 (http://www.n-h-i.org/media/docs/9282_Conj_use.pdf); Zuckerman, et al., in-Delta Delta Vision external submission, "A Water Plan for the 21st Century," July 23, 2007 (http://www.deltavision.ca.gov/docs/externalvisions/EV2_A_Water_Plan_for_the_21st_Century.pdf); South Delta Water Agency and Central Delta Water Agency "Comprehensive Water Management Plan" (CWMP), submitted to the Delta Vision Blue Task Force and dated October 15, 2007 (http://www.deltavision.ca.gov/BlueRibbonTaskForce/Oct2007/Handouts/Item_7_Attachment_2.pdf ), Attachment 2, *San Joaquin River Flood Control Operations: Reservoir Operation Opportunities to Improve Flood Control Performance*, MBK Engineers for San Joaquin River Flood Control Association, June 2005 rev. Sept. 2007; Attachment 3, *South Delta Water Agency Plan for Flood Control: A Comprehensive Flood Conveyance & Ecosystem Restoration Plan for the South Delta*, October 15, 2007.

in combination with more aggressive groundwater banking, water transfers, and multi-use floodplain management, flood easements, new or expanded bypasses, and temporary retention basins, could help to offset adverse supply impacts of future climate change, including altered runoff patterns and declining snowpack.

## IV. **CONCLUSION**:

The "Menu" of mitigation concepts above is hardly an exhaustive one and, yet, it does cover a broad range of potential options to address potential adverse flow and water quality mitigation impacts from dual or isolated conveyance. As stated previously, operational measures and amended water quality standards alone are not likely sufficient to reduce the probable significant adverse impacts of a dual or isolated conveyance system on existing beneficial uses both within and upstream of the Delta. For the BDCP to continue to develop measures to achieve the biological and water supply objectives of the BDCP in isolation from the obvious water rights, water quality, and upstream implications of such actions avoids dealing head-on with a set of very significant obstacles to the ultimate success of the program and is, thus, a gamble neither the State of California, nor any of the parties at the BDCP table cannot afford. To anticipate and address such concerns in a proactive fashion, the BDCP process should move, agilely and decisively, to broaden the range of potential actions and facilities a comprehensive Delta solution may require. Many essential elements of such a solution are beyond the capacity and responsibility of the BDCP, the SWP or the CVP, or the export contractors. This, however, may be where the BDCP might seek to complement a broader, statewide program, and *vice versa*. Thus, BDCP activities and conservation measures would contribute to broad, statewide objectives in proportion to the impacts of their activities and any non-public benefits obtained—but without assuming the entire burden of a comprehensive Delta solution, or precluding other necessary efforts related thereto. Indeed, where essential elements of a comprehensive Delta solution lie outside the immediate scope of the BDCP, it seems there will be a strong need for coordinated milestones and direct linkages to things within the narrower purview of the BDCP and from the BDCP to the broader statewide program. At a minimum, it is hoped, the foregoing list of potential mitigation concepts, water supply, water quality, and ecosystem improvements may serve to stimulate consideration of some of the broader needs of a comprehensive Delta solution and some potential ways the BDCP can pursue its express objectives, while at the same time contributing constructively to a larger statewide plan of action.

# DELTA WATERSHEDS,
# ASSOCIATED WATER CONVEYANCE SYSTEMS AND LOCAL WATER SERVICE AREAS